

SEQUENCE LISTING

<110> Galilaeus Oy

<120> The gene cluster involved in aclacinomycin biosynthesis, and its use for genetic engineering

<130> 33318

<140>

<141>

<160> 16

<170> PatentIn Ver. 2.2

<210> 1

<211> 662

<212> PRT

<213> *Streptomyces galilaeus*

<400> 1

Met Thr Glu Asp Arg Val Thr Thr Leu Gly Gly Glu Gln Ile Ala Leu  
1 5 10 15

Leu Ala Pro Leu Leu Asp Gly Ser Arg Asp Leu Pro Gly Ile Val Ala  
20 25 30

Asp Ala Ala Pro Arg Leu Pro Ala Gly Leu Ala Glu Arg Leu Val Thr  
35 40 45

Arg Leu Leu Asp Ala Gly Leu Leu Cys Ala Tyr Pro Gln Asp Gly Ala  
50 55 60

Asp Arg Pro Glu Arg Ala Tyr Arg Ser Leu Thr Gly Leu Gln Ala Arg  
65 70 75 80

Ser Ala Asp Ala Arg Asp Ala Val Leu Ala Ala Val Asp Leu Thr Gly  
85 90 95

Asp Ala Glu Ser Pro Leu Pro Glu Ala Val Ser Ala Ala Gly Leu Arg  
100 105 110

Ala Ala Ala Pro Gly Glu His Ala Ala Leu Thr Leu Val Leu Cys His  
115 120 125

Asp Tyr Leu Asp Pro Arg Leu Ser Ala Leu Asp Ala Glu His Arg Ala  
130 135 140

Thr Gly Arg Gly Trp Leu Pro Val Arg Ala Asn Gly Thr His Leu Trp  
145 150 155 160

Ile Gly Pro Phe Phe Ser Ala Gly Asp Gly Pro Cys Trp Ser Cys Leu  
165 170 175

Ala Asp Arg Leu Arg Leu Arg Arg Arg Gly Glu Ala Tyr Val Gln His  
180 185 190

Arg Leu Gly His Ser Gly Pro Ala Val His Arg Arg Ala Tyr Leu Pro  
 195 200 205  
 Ala Gly Arg Ala Ala Ala Leu Gln Leu Ala Leu Leu Glu Ala Gly Lys  
 210 215 220  
 Trp Leu Ser Gly His Arg Asp Thr Val Gln Asp Ser Leu Trp Arg Leu  
 225 230 235 240  
 Asp Thr Arg Thr Leu Glu Ser Ser Arg His Pro Val Arg Arg Arg Pro  
 245 250 255  
 Gln Cys Ser Arg Cys Gly Asp Pro Leu Leu Val Arg Asp Arg Val Ser  
 260 265 270  
 Ala Pro Val Val Leu Ser Ser Arg Pro Val Arg Asp Glu Ser Gly Gly  
 275 280 285  
 Gly His Arg Thr Phe Gly Pro Gln Glu Met Leu Asp Arg Tyr Gly His  
 290 295 300  
 Leu Val Asp Pro Val Thr Gly Val Val Gly Glu Ile Arg Arg Asp Pro  
 305 310 315 320  
 Arg Gly Pro Glu Phe Leu Asn Cys Phe Thr Arg Ser Arg Cys Arg Leu  
 325 330 335  
 Gly Pro Arg Ala Ala Pro Pro Ala Leu His Ser Pro Leu Arg Ser Pro  
 340 345 350  
 Gly Ser Gly Lys Gly Val Thr Glu Leu His Ala Arg Val Ser Ala Leu  
 355 360 365  
 Ala Glu Ala Leu Glu Arg Cys Ser Gly Tyr Phe Gln Gly Asp Glu Pro  
 370 375 380  
 Arg Arg Arg Gly Ser Tyr Arg Glu Leu Ala Gly Leu Ala Val His Pro  
 385 390 395 400  
 Asp Ser Val Gln Leu Phe Asp Arg Arg Gln Phe Glu Asp Arg Arg Ala  
 405 410 415  
 Trp Asn Arg Ala His Gly Pro Phe His Gln Val Thr Glu Pro Phe Asp  
 420 425 430  
 Glu Asp Ala Pro Ile Asp Trp Thr Pro Val Trp Ser Leu Thr Glu Arg  
 435 440 445  
 Arg Gln Arg Leu Ala Pro Thr Ser Leu Leu Tyr Tyr Asn Ala Pro Asp  
 450 455 460  
 Ala Asp Thr Gly Phe Cys Arg Ala Thr Ser Asn Gly Ala Ala Ala Gly  
 465 470 475 480  
 Thr Ser Leu Glu Asp Ala Val Val His Gly Cys Leu Glu Leu Val Glu  
 485 490 495

Arg Asp Ala Ile Ala Leu Trp Trp Tyr Asn Arg Thr Arg Gln Pro Gly  
500 505 510

Val Thr Leu Asp Ala Arg Asp Pro Trp Ile Thr Arg Leu Arg Ala Val  
515 520 525

Leu Arg Asp Leu Gly Arg Thr Val Trp Ala Leu Asp Leu Thr Ser Asp  
530 535 540

Leu Gly Ile Pro Val Val Ala Ala Val Ser Val Arg Thr Gly Gly Thr  
545 550 555 560

Ala Glu Asp Ile Val Leu Gly Phe Gly Ala His Phe Asp Pro Arg Ile  
565 570 575

Ala Leu Arg Arg Ala Leu Thr Glu Leu Ser Gln Met Leu Pro Pro Leu  
580 585 590

Ala Gln Glu Thr Ala Gly Asp Ala Ser Ala Tyr Thr Gly Thr Asp Pro  
595 600 605

Glu Ala Met Arg Trp Phe Arg His Ala Thr Thr Ala Asn Gln Pro Tyr  
610 615 620

Leu Leu Pro Ala Ala Arg Arg Ser Ala Arg Pro Pro Ala Ser Leu Arg  
625 630 635 640

Pro Pro Arg Asp Ala Ala Ala Gln Ala Gly Ala Leu Val Ala Leu Leu  
645 650 655

Arg Arg His Gly Leu Glu  
660

<210> 2

<211> 272

<212> PRT

<213> *Streptomyces galilaeus*

<400> 2

Val Asp Ile Trp Leu Leu Gly Pro Leu Thr Ala Glu Val Arg Gly Arg  
1 5 10 15

Ser Ile Val Pro Thr Ala Ala Lys Pro Arg Gln Ile Leu Ala Leu Leu  
20 25 30

Ala Ile His Ala Asn Arg Val Leu Pro Val Gly Thr Leu Met Glu Glu  
35 40 45

Ile Trp Gly Thr Glu Pro Pro Gln Ser Ala Leu Ala Thr Leu His Thr  
50 55 60

Tyr Ile Leu Gln Leu Arg Arg Arg Leu Thr Ala Ala Tyr Gly Asp Glu  
65 70 75 80

Gly Gly Val Ser Ala Lys Asp Val Leu Val Thr Gln Tyr Gly Gly Tyr  
85 90 95

Cys Trp Gln Ala Pro Thr Asp Ser Val Asp Val Pro Arg Tyr Glu Arg  
100 105 110

Leu Val Thr Ala Gly Arg Ile Ala Thr Ala Glu Asp Arg Gln Glu Glu  
115 120 125

Ala Ser Ala His Phe Arg Glu Ala Leu Ala Leu Trp Arg Gly Ser Ala  
130 135 140

Leu Val Asp Val Arg Ile Gly Pro Val Leu Ser Ile Glu Val Ala Arg  
145 150 155 160

Leu Glu Glu Ser Arg Leu Gly Val Leu Glu Arg Cys Leu Glu Ala Asp  
165 170 175

Leu Arg Leu Gly Arg His Ala Glu Leu Leu Ala Glu Leu Thr Glu Leu  
180 185 190

Thr Gly Arg His Pro Leu His Glu Gly Leu His Ala Gln Cys Met Thr  
195 200 205

Ala Leu Tyr Arg Ala Gly Arg Ser Trp Gln Ala Leu Asp Val Tyr Gln  
210 215 220

Arg Leu Arg Arg Arg Leu Ala Glu Glu Leu Gly Leu Ser Pro Ser Pro  
225 230 235 240

Arg Leu Gln Arg Leu Gln Gln Ala Val Leu Ser Ala Glu Pro Trp Leu  
245 250 255

Asp Ala Pro Arg Tyr Gly Gly Asp Pro Val Phe Asp Arg Met Ile Ser  
260 265 270

<210> 3

<211> 434

<212> PRT

<213> *Streptomyces galilaeus*

<400> 3

Met Thr Ser Asp Thr Lys Ala Leu Val Leu Glu Gln Val Arg Glu Tyr  
1 5 10 15

His Arg Gln Gln Gln Pro Gly Asn Phe Gln Pro Gly Val Thr Pro Ile  
20 25 30

Leu Ser Ser Gly Ala Val Leu Asp Glu Glu Asp Arg Val Ala Leu Val  
35 40 45

Glu Ala Ala Leu Asp Leu Arg Ile Ala Ala Gly Ala His Ser Arg Arg  
50 55 60

Phe Glu Ser Lys Phe Ala Arg His Ile Gly Val Arg Lys Ala His Leu  
65 70 75 80

Val Asn Ser Gly Ser Ser Ala Asn Leu Leu Ala Leu Ser Ala Leu Thr  
85 90 95

Ser Pro Arg Leu Gly Glu Gln Arg Leu Arg Pro Gly Asp Glu Val Ile  
 100 105 110  
 Thr Val Ala Gly Gly Phe Pro Thr Thr Val Asn Pro Ile Leu Gln Asn  
 115 120 125  
 Gly Leu Thr Pro Val Phe Val Asp Leu Glu Leu Gly Thr Tyr Asn Thr  
 130 135 140  
 Thr Val Glu His Val Arg Ala Ala Ile Ser Asp Arg Thr Arg Ala Ile  
 145 150 155 160  
 Met Ile Ala His Thr Leu Gly Asn Pro Tyr Gln Val Ala Glu Ile Gln  
 165 170 175  
 Gln Leu Ala Thr Glu His Glu Leu Phe Leu Ile Glu Asp Asn Cys Asp  
 180 185 190  
 Ala Val Gly Ser Thr Tyr Gln Gly Arg Met Thr Gly Thr Phe Gly Asp  
 195 200 205  
 Leu Ala Thr Val Ser Phe Tyr Pro Ala His His Ile Thr Thr Gly Glu  
 210 215 220  
 Gly Gly Cys Val Leu Thr Arg Asn Leu Glu Leu Ala Arg Ile Val Glu  
 225 230 235 240  
 Ser Phe Arg Asp Trp Gly Arg Asp Cys Trp Cys Glu Pro Gly Glu Asp  
 245 250 255  
 Asn Thr Cys Leu Lys Arg Phe Asp Tyr Gln Leu Gly Asn Leu Pro Lys  
 260 265 270  
 Gly Tyr Asp His Lys Tyr Ile Phe Ser His Ile Gly Tyr Asn Leu Lys  
 275 280 285  
 Ala Thr Asp Leu Gln Gly Ala Leu Ala Leu Ser Gln Leu Asn Lys Leu  
 290 295 300  
 Pro Glu Phe Gly Ala Ala Arg Arg Arg Asn Trp Gln Arg Leu Arg Asp  
 305 310 315 320  
 Gly Leu Ala Asp Val Pro Gly Leu Leu Leu Pro Val Ala Thr Pro Gly  
 325 330 335  
 Ser Asp Pro Ser Trp Phe Gly Phe Val Ile Thr Val Leu Pro Asp Ala  
 340 345 350  
 Thr Tyr Thr Arg Arg Asp Leu Val Ala Phe Leu Glu Glu Arg Arg Ile  
 355 360 365  
 Gly Thr Arg Arg Leu Phe Gly Gly Asn Leu Thr Arg His Pro Ala Tyr  
 370 375 380  
 Leu Gly Thr Pro His Arg Val Ala Gly Asp Leu Arg Asn Ser Asp Ile  
 385 390 395 400

Ile Thr Glu Gln Ser Phe Trp Ile Gly Val Tyr Pro Gly Ile Thr Glu  
 405 410 415

Glu Met Thr Asp Tyr Met Arg Glu Ser Ile Val Glu Phe Val Thr Lys  
 420 425 430

Asn Gly

<210> 4

<211> 329

<212> PRT

<213> *Streptomyces galilaeus*

<400> 4

Met Pro Lys Asp Thr Pro Arg Pro Val Leu Arg Ile Gly Val Leu Gly  
 1 5 10 15

Cys Ala Asp Ile Ala Val Arg Arg Ile Leu Pro Ala Ile Val Glu His  
 20 25 30

Pro Ser Val Arg Leu Val Ala Leu Ala Ser Arg Asp Gly Ala Arg Ala  
 35 40 45

Glu Arg Leu Ala Ala Arg Phe Gly Cys Ala Ala Val Thr Gly Tyr Lys  
 50 55 60

Ala Leu Leu Asp Arg Glu Asp Ile Asn Ala Val Tyr Val Pro Leu Pro  
 65 70 75 80

Pro Gly Met His His Glu Trp Val Thr Glu Ala Leu Thr Ala Gly Lys  
 85 90 95

His Val Leu Val Glu Lys Pro Leu Ser Thr Thr Tyr Ala Gln Ser Val  
 100 105 110

Asp Leu Val Ala Met Ala Gly Arg Leu Gly Leu Ala Leu Thr Glu Asn  
 115 120 125

Phe Met Phe Leu His His Ser Gln His Glu Ala Val Arg Ala Met Thr  
 130 135 140

Gly Glu Ile Gly Glu Leu Arg Val Phe Thr Ser Ser Phe Gly Val Pro  
 145 150 155 160

Pro Pro His Pro Ser Ser Phe Arg His Asp Ala Arg Leu Gly Gly Gly  
 165 170 175

Ala Leu Leu Asp Val Gly Val Tyr Pro Leu Arg Ala Ala Gln Leu His  
 180 185 190

Leu Ala Gly Glu Leu Asp Val Leu Gly Ala Cys Leu Arg Val Asp Glu  
 195 200 205

Ala Thr Gly Val Asp Val Ala Gly Ser Ala Leu Leu Ser Thr Ala Thr  
 210 215 220

Gly Val Thr Ala Gln Leu Asp Phe Gly Phe Gln His Ala Tyr Arg Ser  
225 230 235 240

Val Tyr Ala Leu Trp Gly Ser Arg Gly Arg Leu Ser Val Pro Arg Ala  
245 250 255

Phe Thr Pro Pro Arg Glu His Arg Pro Val Val Arg Ile Glu Gln Gln  
260 265 270

Asp Arg Leu Thr Glu Val Thr Leu Pro Ala Asp His Gln Val Gly Asn  
275 280 285

Ala Leu Asp Ala Phe Ala Ser Ala Val His Ser Glu Thr Val Arg Ala  
290 295 300

Ser Leu Gly Glu Ala Leu Leu Arg Gln Ala Leu Leu Val Glu Gln Val  
305 310 315 320

Arg Lys Ala Ala Arg Val Val Ser Gly  
325

<210> 5

<211> 323

<212> PRT

<213> *Streptomyces galilaeus*

<400> 5

Met Arg Val Leu Ile Thr Gly Gly Ala Gly Phe Ile Gly Ser His Tyr  
1 5 10 15

Val Arg Ser Leu Leu Ala Gly Thr Leu Pro Gly Pro Arg Pro Ser Arg  
20 25 30

Val Thr Val Val Asp Leu Leu Thr Tyr Ala Gly Asp Thr Gly Asn Leu  
35 40 45

Pro Leu Ala Asp Pro Arg Leu Asp Phe Arg Arg Leu Asp Ile Arg Asp  
50 55 60

Leu Asp Ala Leu Leu Thr Val Val Pro Gly His Asp Ala Val Val His  
65 70 75 80

Phe Ala Ala Glu Thr His Val Asp Arg Ser Leu Ser Glu Pro Ala Glu  
85 90 95

Phe Val Arg Thr Asn Val Leu Gly Thr Gln Ser Leu Leu Glu Ala Ser  
100 105 110

Leu Arg Gly Gly Val Gly Thr Phe Val His Val Ser Thr Asp Glu Val  
115 120 125

Tyr Gly Ser Ile Ala Gln Gly Thr Trp Thr Glu Glu Ala Pro Leu Leu  
130 135 140

Pro Asn Ser Pro Tyr Ala Ala Ser Lys Ala Gly Ser Asp Leu Val Ala  
145 150 155 160

Arg Ser Tyr Trp Arg Thr His Gly Leu Asp Val Arg Thr Thr Arg Cys  
165 170 175

Ala Asn Asn Tyr Gly Pro Arg Gln His Pro Glu Lys Leu Ile Pro Leu  
180 185 190

Phe Val Thr Glu Leu Leu Ala Gly Arg Pro Val Pro Leu Tyr Gly Asp  
195 200 205

Gly Gly Asn Val Arg Glu Trp Leu His Val Asp Asp His Cys Arg Ala  
210 215 220

Val His Ala Val Leu Thr Gly Gly Arg Pro Gly Glu Ile Tyr Asn Ile  
225 230 235 240

Gly Gly Gly Thr His Leu Thr Asn Arg Glu Met Thr Ala Lys Leu Leu  
245 250 255

Ala Leu Cys Gly Thr Asp Trp Ser Arg Val Arg Gln Val Pro Asp Arg  
260 265 270

Lys Gly His Asp Leu Arg Tyr Ala Val Asp Asp Thr Lys Ile Arg Glu  
275 280 285

Glu Leu Gly Tyr Arg Pro Leu Arg Ser Leu Asp Asp Gly Leu Arg Glu  
290 295 300

Val Val Asp Trp Tyr Arg Asp Arg Gln Thr His Arg Pro Glu Pro Ala  
305 310 315 320

Glu Arg Val

<210> 6

<211> 443

<212> PRT

<213> *Streptomyces galilaeus*

<400> 6

Met Arg Val Leu Leu Thr Ser Phe Ala Leu Asp Ala His Phe Asn Gly  
1 5 10 15

Ser Val Pro Leu Ala Trp Ala Leu Arg Ala Ala Gly His Glu Val Arg  
20 25 30

Val Ala Ser Gln Pro Ala Leu Thr Ala Ser Ile Thr Ala Ala Gly Leu  
35 40 45

Thr Ala Val Pro Val Gly Ala Asp Pro Arg Leu Asp Glu Met Val Lys  
50 55 60

Gly Val Gly Asp Ala Val Leu Ser His His Ala Asp Gln Ser Leu Asp  
65 70 75 80

Ala Asp Thr Pro Gly Gln Leu Thr Pro Ala Phe Leu Gln Gly Trp Asp  
85 90 95



Thr Met Met Thr Ala Thr Phe Tyr Thr Leu Ile Asn Asp Asp Pro Met  
 100 105 110  
 Val Asp Asp Leu Val Ala Phe Ala Arg Gly Trp Glu Pro Asp Leu Ile  
 115 120 125  
 Leu Trp Glu Pro Phe Thr Phe Ala Gly Ala Val Ala Ala Lys Val Thr  
 130 135 140  
 Gly Ala Ala His Ala Arg Leu Leu Ser Phe Pro Asp Leu Phe Met Ser  
 145 150 155 160  
 Met Arg Arg Ala Tyr Leu Ala Gln Leu Gly Ala Ala Pro Ala Gly Pro  
 165 170 175  
 Ala Gly Gly Asn Gly Thr Thr His Pro Asp Asp Ser Leu Gly Gln Trp  
 180 185 190  
 Leu Glu Trp Thr Leu Gly Arg Tyr Gly Val Pro Phe Asp Glu Glu Ala  
 195 200 205  
 Val Thr Gly Gln Trp Ser Val Asp Gln Val Pro Arg Ser Phe Arg Pro  
 210 215 220  
 Pro Ser Asp Arg Pro Val Val Gly Met Arg Tyr Val Pro Tyr Asn Gly  
 225 230 235 240  
 Pro Gly Pro Ala Val Val Pro Asp Trp Leu Arg Val Pro Pro Thr Arg  
 245 250 255  
 Pro Arg Val Cys Val Thr Leu Gly Met Thr Ala Arg Thr Ser Glu Phe  
 260 265 270  
 Pro Asn Ala Val Pro Val Asp Leu Val Leu Lys Ala Val Glu Gly Leu  
 275 280 285  
 Asp Ile Glu Val Val Ala Thr Leu Asp Ala Glu Glu Arg Ala Leu Leu  
 290 295 300  
 Thr His Val Pro Asp Asn Val Arg Leu Val Asp His Val Pro Leu His  
 305 310 315 320  
 Ala Leu Leu Pro Thr Cys Ala Ala Ile Val His His Gly Gly Ala Gly  
 325 330 335  
 Thr Trp Ser Thr Ala Leu Val Glu Gly Val Pro Gln Ile Ala Met Gly  
 340 345 350  
 Trp Ile Trp Asp Ala Ile Asp Arg Ala Gln Arg Gln Gln Ala Leu Gly  
 355 360 365  
 Ala Gly Leu His Leu Pro Ser His Glu Val Thr Val Glu Gly Leu Arg  
 370 375 380  
 Gly Arg Leu Val Arg Leu Leu Asp Glu Pro Ser Phe Thr Ala Ala Ala  
 385 390 395 400

Ala Arg Leu Arg Ala Glu Ala Glu Ser Glu Pro Thr Pro Ala Gln Val  
 405 410 415

Val Pro Val Leu Glu Arg Leu Thr Ala Gln His Arg Ala Arg Glu Pro  
 420 425 430

Arg Arg Pro Gly Gly Thr Ser Pro Cys Val Ser  
 435 440

<210> 7

<211> 443

<212> PRT

<213> *Streptomyces galilaeus*

<400> 7

Val Gln Thr Gln Asn Ala Pro Glu Thr Ala Glu Asn Gln Gln Thr Asp  
 1 5 10 15

Ser Glu Leu Gly Arg His Leu Leu Thr Ala Arg Gly Phe His Trp Ile  
 20 25 30

Tyr Gly Thr Ser Gly Asp Pro Tyr Ala Leu Thr Leu Arg Ala Glu Ser  
 35 40 45

Asp Asp Pro Ala Leu Leu Thr Arg Arg Ile Arg Glu Ala Gly Thr Pro  
 50 55 60

Leu Trp Gln Ser Thr Thr Gly Ala Trp Val Thr Gly Arg His Gly Val  
 65 70 75 80

Ala Ala Glu Ala Leu Ala Asp Pro Arg Leu Ala Leu Arg His Ala Asp  
 85 90 95

Leu Pro Gly Pro Gln Arg His Val Phe Ser Asp Ala Trp Ser Asn Pro  
 100 105 110

Gln Leu Cys His Ile Ile Pro Leu Asp Arg Ala Phe Leu His Ala Ser  
 115 120 125

Asp Ala Asp His Thr Arg Trp Ala Arg Ser Ala Ser Ala Val Leu Gly  
 130 135 140

Ser Ala Gly Gly Ala Pro Ala Glu Gly Val Arg Glu His Ala Gly Arg  
 145 150 155 160

Val His Arg Glu Ala Ala Asp Arg Thr Gly Asp Ser Phe Asp Leu Met  
 165 170 175

Ala Asp Tyr Ser Arg Pro Val Ala Thr Glu Ala Ala Ala Glu Leu Leu  
 180 185 190

Gly Val Pro Ala Ala Gln Arg Glu Arg Phe Ala Ala Thr Cys Leu Ala  
 195 200 205

Leu Gly Val Ala Leu Asp Ala Ala Leu Cys Pro Gln Pro Leu Ala Val  
 210 215 220

Thr Arg Arg Leu Thr Glu Ala Val Glu Asp Val Arg Ala Leu Val Gly  
225 230 235 240

Asp Leu Val Glu Ala Arg Arg Thr Gln Pro Gly Asp Asp Leu Leu Ser  
245 250 255

Ala Val Leu His Ala Gly Ser Ser Ala Ala Ser Ala Gly Gln Asp Ala  
260 265 270

Leu Ala Val Gly Val Leu Thr Ala Val Val Gly Val Glu Val Thr Ala  
275 280 285

Gly Leu Ile Asn Asn Thr Leu Glu Ser Leu Leu Thr Arg Pro Val Gln  
290 295 300

Trp Ala Arg Leu Gly Glu Asn Pro Glu Leu Ala Ala Gly Ala Val Glu  
305 310 315 320

Glu Ala Leu Arg Phe Ala Pro Pro Val Arg Leu Glu Ser Arg Ile Ala  
325 330 335

Ala Glu Asp Leu Thr Leu Gly Gly Gln Asp Leu Pro Ala Gly Ala Gln  
340 345 350

Val Val Val His Val Gly Ala Ala Asn Arg Asp Pro Glu Ala Phe Leu  
355 360 365

Ala Pro Asp His Phe Asp Leu Asp Arg Pro Ala Gly Gln Gly Gln Leu  
370 375 380

Ser Leu Ser Gly Pro His Thr Ala Leu Phe Gly Ala Phe Ala Arg Leu  
385 390 395 400

Gln Ala Glu Thr Ala Val Arg Thr Leu Arg Glu Arg Arg Pro Val Leu  
405 410 415

Ala Pro Ala Gly Ala Val Leu Arg Arg Met Arg Ser Pro Val Leu Gly  
420 425 430

Ala Val Leu Arg Phe Pro Leu Thr Thr Ser Ala  
435 440

<210> 8

<211> 267

<212> PRT

<213> *Streptomyces galilaeus*

<400> 8

Val Asn Arg Ala Ala Arg Pro Thr Val Arg Gly Met Ser Ala Ile Ala  
1 5 10 15

Glu Pro Thr Ala Pro Arg Gly Val Ile Val Thr Gly Gly Gly Thr Gly  
20 25 30

Ile Gly Arg Ala Thr Ala His Ala Phe Ala Asp Arg Gly Asp Arg Val  
35 40 45

Leu Val Val Gly Arg Thr Ala Ala Thr Leu Ala Gly Thr Ala Glu Gly  
 50 55 60  
 His Pro Gly Ile Ser Val Leu Thr Ala Asp Leu Thr Asp Pro Asp Gly  
 65 70 75 80  
 Pro Arg Ala Ile Thr Asp Ala Ala Leu Asp Ala Leu Gly Arg Ile Asp  
 85 90 95  
 Val Leu Val Asn Asn Ala Ala Thr Gly Gly Phe Ala Gly Leu Ala Glu  
 100 105 110  
 Thr Glu Pro Glu Ala Ala Arg Glu Gln Phe Asp Ser Asn Leu Leu Ala  
 115 120 125  
 Pro Leu Leu Leu Thr Arg Gln Thr Leu Asp Ala Leu Ser Ala Asp Gly  
 130 135 140  
 Gly Gly Thr Val Leu Asn Ile Gly Ser Ala Gly Ala Leu Gly Arg Arg  
 145 150 155 160  
 Ala Trp Pro Gln Asn Gly Val Tyr Gly Ala Ala Lys Ala Gly Leu Asp  
 165 170 175  
 Phe Leu Thr Arg Thr Trp Ala Val Glu Leu Ala Pro Arg Gly Ile Arg  
 180 185 190  
 Val Leu Gly Leu Ala Pro Gly Val Ile Asp Thr Gly Ile Gly Glu Arg  
 195 200 205  
 Ser Gly Met Ser Arg Glu Ala Tyr Ala Gly Phe Leu Gly Gln Ile Ala  
 210 215 220  
 Ala Arg Val Pro Ala Gly Arg Val Gly Arg Pro Glu Asp Ile Ala Trp  
 225 230 235 240  
 Trp Ala Val Gln Leu Ala Asp Pro Arg Ala Ala Tyr Ala Thr Gly Ala  
 245 250 255  
 Val Leu Ala Val Asp Gly Gly Leu Ser Leu Thr  
 260 265

&lt;210&gt; 9

&lt;211&gt; 144

&lt;212&gt; PRT

<213> *Streptomyces galilaeus*

&lt;400&gt; 9

Met Thr Ala Gln Ala Pro Thr Ala Pro Ala Asp Val Tyr Ala Glu Val  
 1 5 10 15  
 Gln His Phe Tyr Ala Arg Gln Met Arg Tyr Leu Asp Ser Gly Glu Ala  
 20 25 30  
 Glu Thr Trp Ala Gly Thr Phe Thr Glu Asp Gly Ser Phe Ala Pro Pro  
 35 40 45

Ser Leu Pro Glu Pro Val Arg Gly Arg Pro Leu Leu Ala Glu Gly Ala  
50 55 60

Arg Asn Ala Ala Ala Gly Leu Ala Ala Ala Arg Glu Thr His Arg His  
65 70 75 80

Trp Val Gly Met Leu Thr Val Thr Pro Ala Asp Asp Gly Ser Leu Thr  
85 90 95

Ala Glu Ser Leu Val Ser Ile Val Ala Val Ala Gln Gly Gly Pro Ala  
100 105 110

Arg Leu His Leu Val Cys Thr Cys Arg Asp Val Leu Val Arg Glu Gly  
115 120 125

Gly Arg Leu Leu Val Arg Glu Arg Val Val Thr Arg Asp Asp Arg Pro  
130 135 140

<210> 10

<211> 259

<212> PRT

<213> *Streptomyces galilaeus*

<400> 10

Val Arg Ile Ile Asp Leu Ser Ser Pro Val Asp Ala Ala Gly Phe Glu  
1 5 10 15

Pro Asp Pro Val Val His Asp Val Leu Gly Pro Lys Glu Ala Ala Thr  
20 25 30

His Met Ser Glu Glu Met Arg Glu His Phe Gly Ile Asp Phe Asp Pro  
35 40 45

Ala Glu Leu Pro Glu Gly Glu Phe Leu Ser Leu Asp Arg Leu Gln Leu  
50 55 60

Thr Thr His Thr Gly Thr His Val Asp Ala Pro Ser His Tyr Gly Thr  
65 70 75 80

Arg Ala Ala Tyr Arg Asp Gly Pro Pro Arg His Ile Asp Glu Met Pro  
85 90 95

Leu Asp Trp Phe Phe Arg Pro Ala Val Val Leu Asp Leu Ser Asp Gln  
100 105 110

Gly Thr Gly Ala Val Gly Ala Asp Val Leu Arg Arg Glu Met Asp Arg  
115 120 125

Ile Gly His Thr Pro Ser Pro Met Asp Ile Val Leu Leu Arg Thr Gly  
130 135 140

Ala Asp Ala Trp Ala Gly Thr Pro Lys Tyr Phe Thr Asp Phe Thr Gly  
145 150 155 160

Leu Asp Gly Ser Ala Val His Leu Leu Leu Asp Leu Gly Val Arg Val  
165 170 175

Ile Gly Thr Asp Ala Phe Ser Leu Asp Ala Pro Phe Gly Asp Ile Ile  
180 185 190

Thr Arg Tyr Arg Ala Thr Gly Asp Pro Ser Val Leu Trp Pro Ala His  
195 200 205

Val Ile Gly Arg Asp Arg Glu Tyr Cys Gln Val Glu Arg Leu Ala Gly  
210 215 220

Leu Asp Arg Leu Pro Ala Ala His Gly Phe Arg Val Ala Cys Phe Pro  
225 230 235 240

Val Arg Ile Ala Gly Ala Gly Ala Gly Trp Thr Arg Ala Val Ala Leu  
245 250 255

Val Asp Glu

<210> 11

<211> 238

<212> PRT

<213> *Streptomyces galilaeus*

<400> 11

Met Tyr Gly Arg Glu Leu Ala Asp Val Tyr Glu Ala Ile Tyr Arg Ser  
1 5 10 15

Arg Gly Lys Asp Trp Gly Gln Glu Ala Ala Asp Val Ser Arg Ile Ile  
20 25 30

Thr Glu Arg Arg Pro Gly Ala Gly Ser Leu Leu Asp Val Ala Cys Gly  
35 40 45

Thr Gly Ala His Leu Ser Val Phe Ser Thr Leu Phe Glu Val Ala Glu  
50 55 60

Gly Leu Glu Ile Ala Glu Pro Met Arg Arg Leu Ala Glu Gln Arg Leu  
65 70 75 80

Pro Gly Thr Thr Val His Ala Gly Asp Met Arg Asp Phe Arg Leu Pro  
85 90 95

Arg Thr Tyr Asp Ala Val Ser Cys Met Phe Cys Ala Ile Gly Tyr Leu  
100 105 110

Glu Thr Leu Asp Asp Met Arg Ala Ala Val Arg Ser Met Ala Ala His  
115 120 125

Leu Glu Pro Gly Gly Val Leu Val Val Glu Pro Trp Trp Phe Pro Glu  
130 135 140

Asn Phe Ile Glu Gly Tyr Val Ala Gly Asp Leu Ala Arg Glu Glu His  
145 150 155 160

Arg Thr Ile Ala Arg Ile Ser His Thr Thr Arg Lys Gly Arg Ala Thr  
165 170 175

Arg Met Glu Val Arg Phe Thr Val Gly Asp Ala Ala Gly Ile Gln Gln  
 180 185 190

Phe Thr Glu Ile Asp Val Leu Thr Leu Phe Thr Arg Asp Glu Tyr Thr  
 195 200 205

Ala Ala Phe Thr Asp Ala Gly Cys Ser Val Glu Phe Leu Glu Asp Gly  
 210 215 220

Pro Thr Gly Arg Gly Leu Phe Val Gly Val Arg Glu Gln Arg  
 225 230 235

<210> 12

<211> 291

<212> PRT

<213> *Streptomyces galilaeus*

<400> 12

Met Lys Gly Ile Ile Leu Ala Gly Gly Ser Gly Thr Arg Leu His Pro  
 1 5 10 15

Ile Thr Val Ser Val Ser Lys Gln Leu Leu Pro Val Gly Asp Lys Pro  
 20 25 30

Met Ile Tyr Tyr Pro Leu Ser Val Leu Met Leu Ala Asp Ile Arg Glu  
 35 40 45

Ile Leu Leu Ile Cys Thr Glu Arg Asp Leu Glu Gln Phe Arg Arg Leu  
 50 55 60

Leu Gly Asp Gly Ser Gln Leu Gly Leu Arg Ile Asp Tyr Ala Val Gln  
 65 70 75 80

Asn Arg Pro Ala Gly Leu Ala Asp Ala Phe Val Ile Gly Ala Asp His  
 85 90 95

Val Gly Asp Asp Asp Val Ala Leu Val Leu Gly Asp Asn Ile Phe His  
 100 105 110

Gly His His Phe Tyr Asp Leu Leu Gln Ser Asn Val His Asp Val Gln  
 115 120 125

Gly Cys Val Leu Phe Gly Tyr Pro Val Glu Asp Pro Glu Arg Tyr Gly  
 130 135 140

Val Gly Glu Thr Asp Ala Ser Gly Gln Leu Val Ser Leu Glu Glu Lys  
 145 150 155 160

Pro Leu Arg Pro Arg Ser Asp Leu Ala Ile Thr Gly Leu Tyr Leu Tyr  
 165 170 175

Asp Asn Glu Val Val Asp Ile Ala Lys Asn Leu Arg Pro Ser Pro Arg  
 180 185 190

Gly Glu Leu Glu Ile Thr Asp Val Asn Arg Asn Tyr Leu Ala Arg Gly  
 195 200 205

Arg Ala Arg Leu Val Asp Leu Gly Arg Gly Phe Ala Trp Leu Asp Ala  
210 215 220

Gly Thr Pro Glu Ser Leu Leu Gln Ala Thr Gln Tyr Val Arg Thr Leu  
225 230 235 240

Glu Glu Arg Gln Gly Val Arg Ile Ala Cys Val Glu Glu Val Ala Leu  
245 250 255

Arg Met Gly Phe Ile Asp Ala Asp Met Cys His Arg Leu Gly Glu Gln  
260 265 270

Met Ser Gln Ser Gly Tyr Gly Arg Tyr Val Met Ala Val Ala Arg Glu  
275 280 285

Phe Ser Gly  
290

<210> 13

<211> 341

<212> PRT

<213> *Streptomyces galilaeus*

<400> 13

Met Thr Thr Leu Val Trp Asp Tyr Leu Gln Glu Tyr Glu Asn Glu Arg  
1 5 10 15

Ala Asp Ile Leu Asp Ala Val Glu Thr Val Phe Ser Ser Gly Arg Leu  
20 25 30

Val Leu Gly Asp Ser Val Arg Gly Phe Glu Glu Glu Phe Ala Ala Tyr  
35 40 45

His Gly Ala Ala His Cys Val Gly Val Asp Asn Gly Thr Asn Ala Ile  
50 55 60

Lys Leu Ala Leu Gln Ala Leu Gly Val Gly Pro Gly Asp Glu Val Val  
65 70 75 80

Thr Val Ser Asn Thr Ala Ala Pro Thr Val Val Ala Ile Asp Ser Val  
85 90 95

Gly Ala Thr Pro Val Phe Val Asp Val His Pro Asp Ser Tyr Leu Met  
100 105 110

Asp Thr Glu Gln Val Glu Ala Ala Leu Thr Pro Arg Thr Arg Cys Leu  
115 120 125

Leu Pro Val His Leu Tyr Gly Gln Cys Val Asp Leu Ala Pro Leu Glu  
130 135 140

Arg Leu Ala Ala Glu His Asp Leu Phe Leu Val Glu Asp Cys Ala Gln  
145 150 155 160

Ala His Gly Ala Arg Arg Ala Gly Arg Leu Ala Gly Thr Thr Gly Asp  
165 170 175



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